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Standerfer et al.

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(54) **CENTRAL IRRIGATION CONTROL SYSTEM**

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USPC 700/284; 239/69; 715/700, 764, 771, 715/772, 808, 810, 835, 846, 853, 961, 965
See application file for complete search history.

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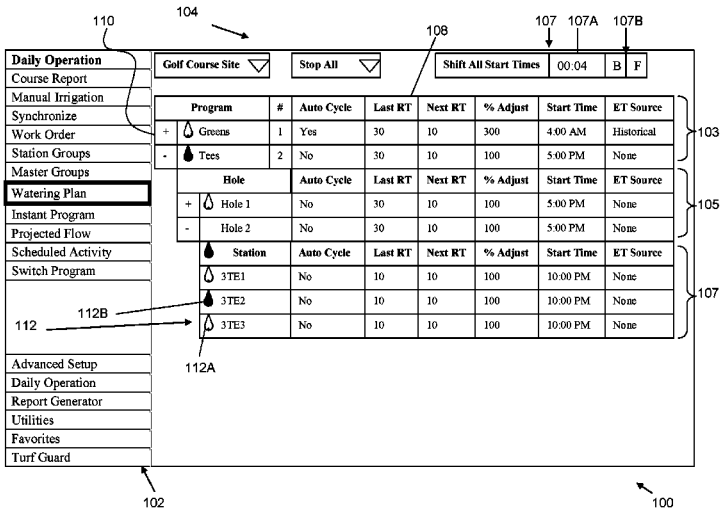
(57) **ABSTRACT**

In one embodiment of the present invention, irrigation software is provided for an irrigation system. The irrigation software may include a hierarchical watering plan display, water pump adjustment, water pump efficiency profile use, a soil moisture interface, a historical flow interface, a demand ET interface, an instant program interface, an instant program interface, a manual irrigation interface, a precipitation management group interface, a rain schedule adjustment algorithm, a map-to-monitor button, a universal start time shift interface, and a conditional screen saver.

18 Claims, 17 Drawing Sheets



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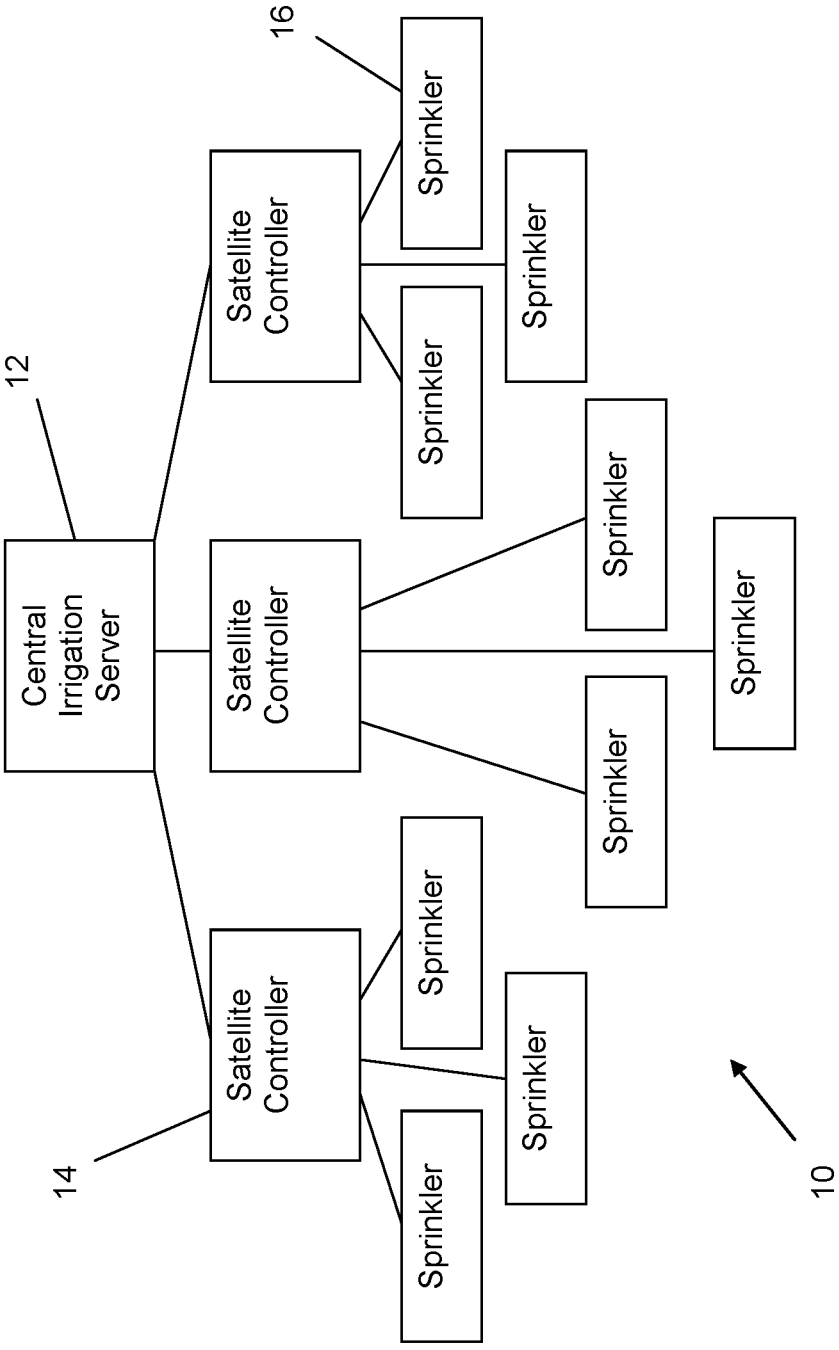
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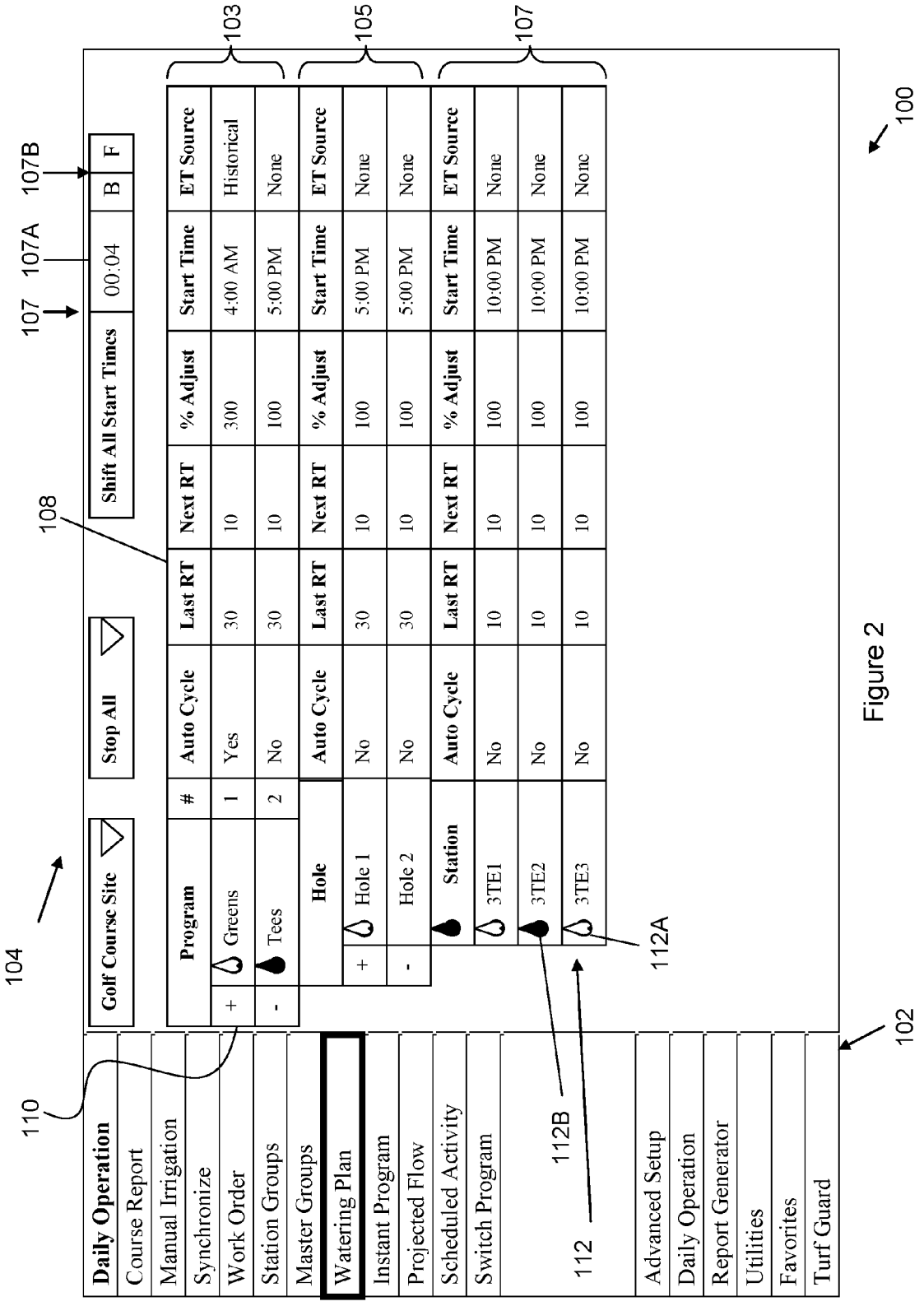
Figure 1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No
10
10
100
10:00 PM
None
100
102
103
104
105
107
107A
107B
108
110
112
112A
112B

Figure 2

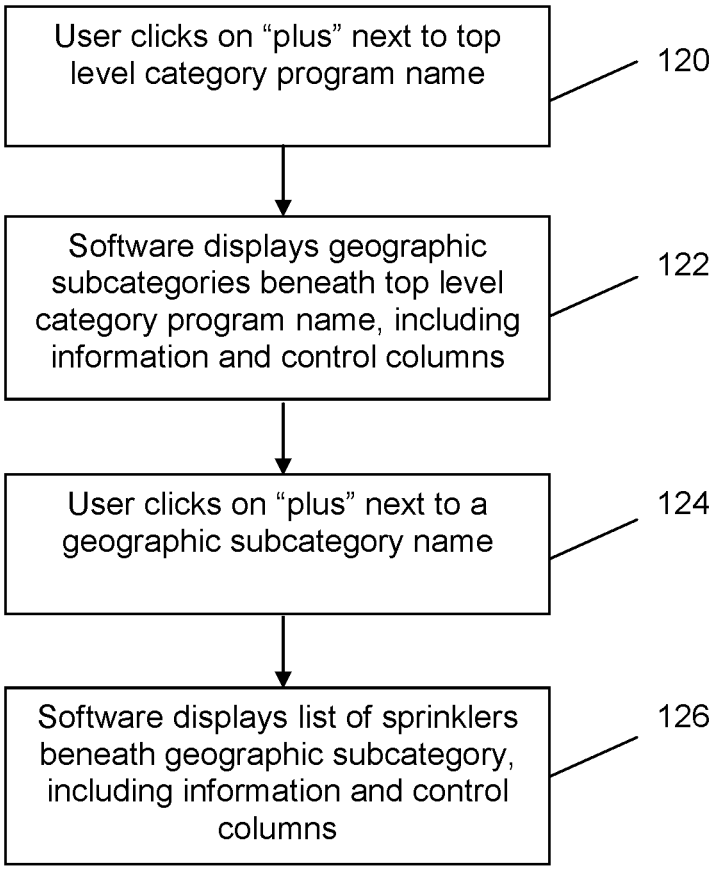
User clicks on "plus" next to top level category program name
120
Software displays geographic subcategories beneath top level category program name, including information and control columns
122
User clicks on "plus" next to a geographic subcategory name
124
Software displays list of sprinklers beneath geographic subcategory, including information and control columns
126

Figure 3

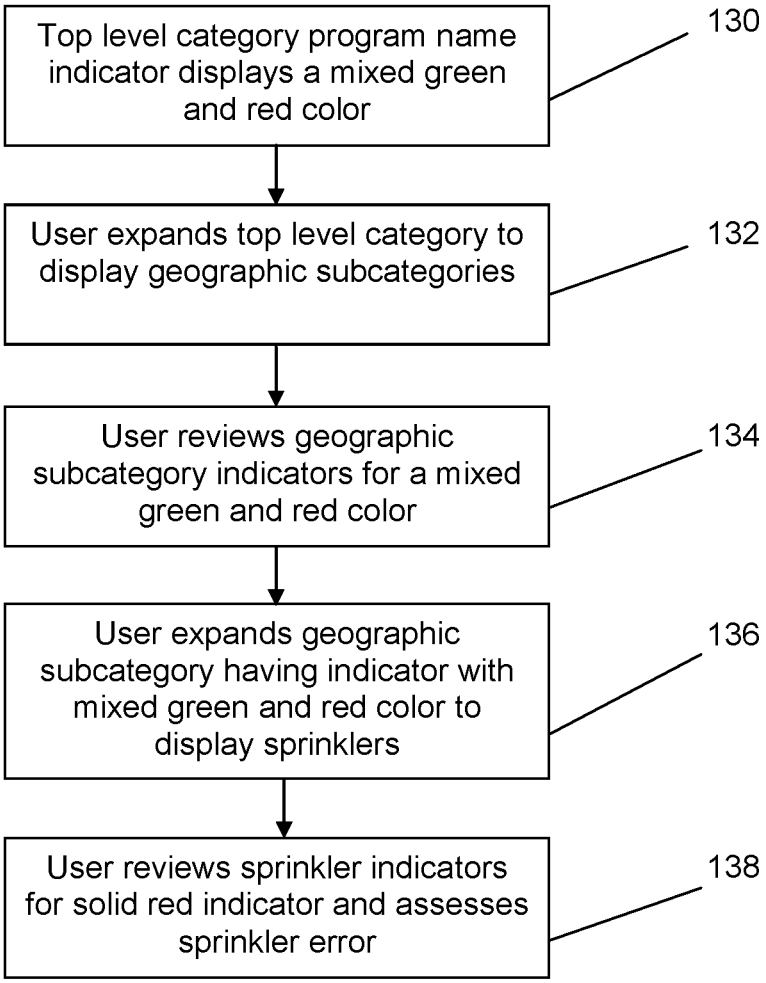
Top level category program name indicator displays a mixed green and red color
130
User expands top level category to display geographic subcategories
132
User reviews geographic subcategory indicators for a mixed green and red color
134
User expands geographic subcategory having indicator with mixed green and red color to display sprinklers
136
User reviews sprinkler indicators for solid red indicator and assesses sprinkler error
138

Figure 4

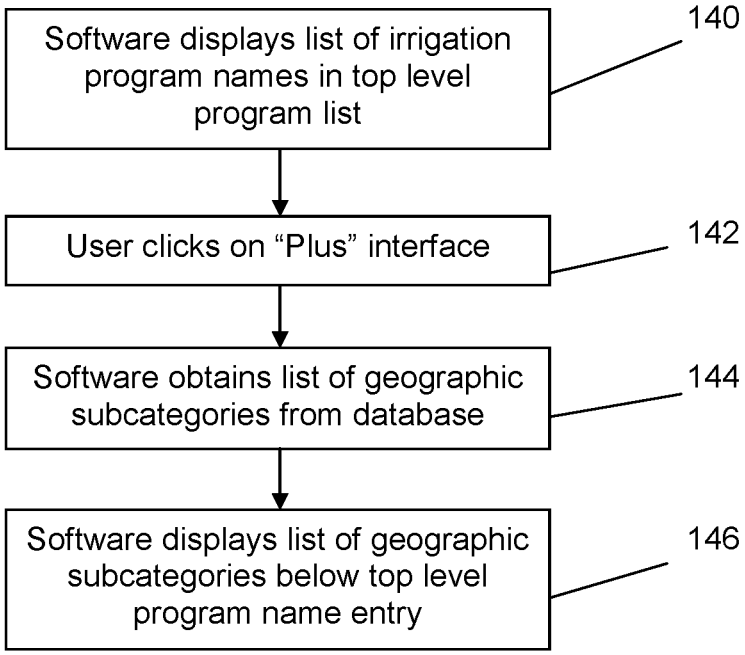
Software displays list of irrigation program names in top level program list
140
User clicks on "Plus" interface
142
Software obtains list of geographic subcategories from database
144
Software displays list of geographic subcategories below top level program name entry
146

Figure 5

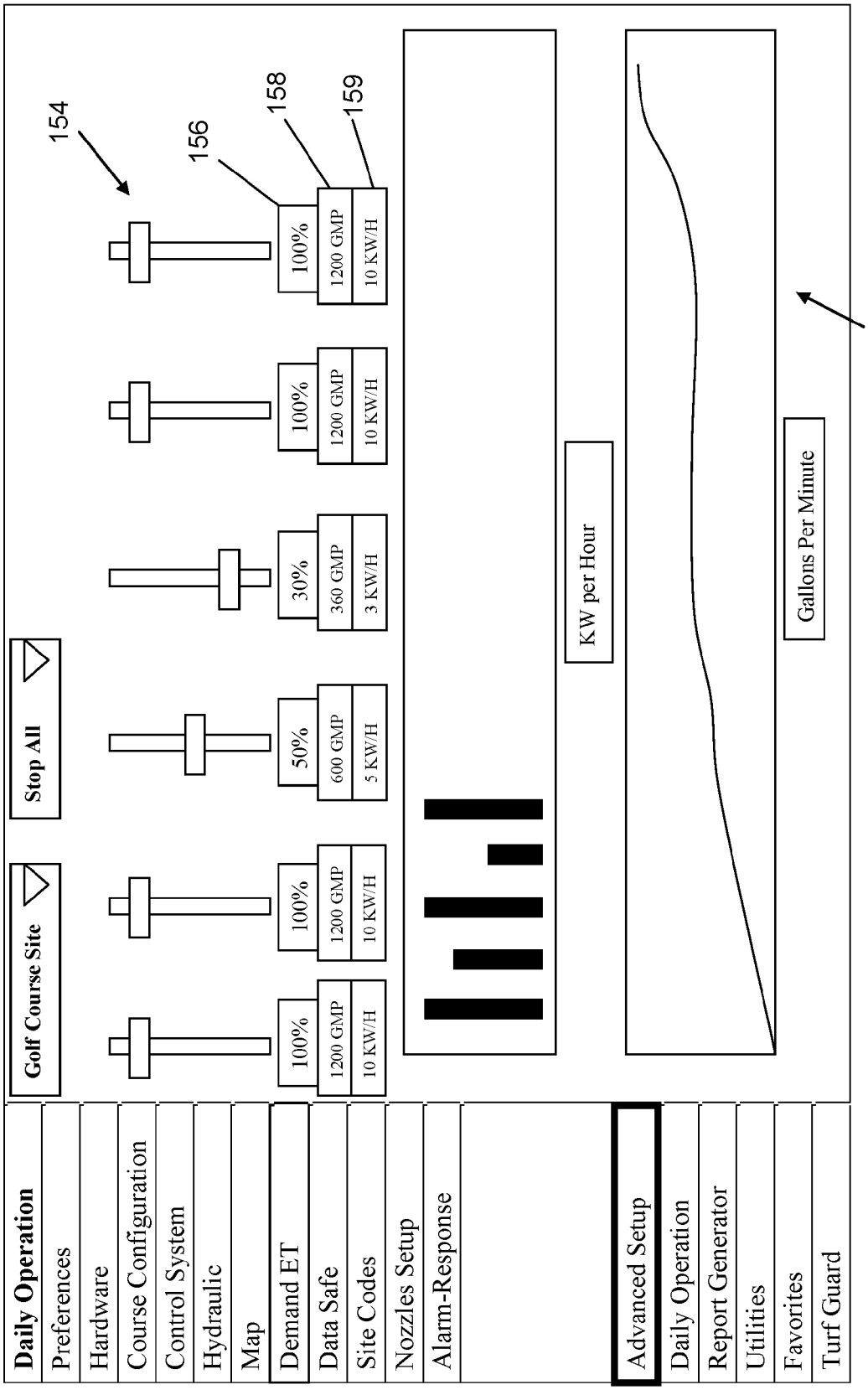
Daily Operation
Preferences
Hardware
Course Configuration
Control System
Hydraulic
Map
Demand ET
Data Safe
Site Codes
Nozzles Setup
Alarm-Response
Advanced Setup
Daily Operation
Report Generator
Utilities
Favorites
Turf Guard
Golf Course Site
Stop All
100%
1200 GMP
10 KW/H
100%
1200 GMP
10 KW/H
50%
600 GMP
5 KW/H
30%
360 GMP
3 KW/H
100%
1200 GMP
10 KW/H
100%
1200 GMP
10 KW/H
KW per Hour
Gallons Per Minute
154
156
158
159
152
150
102

Figure 6

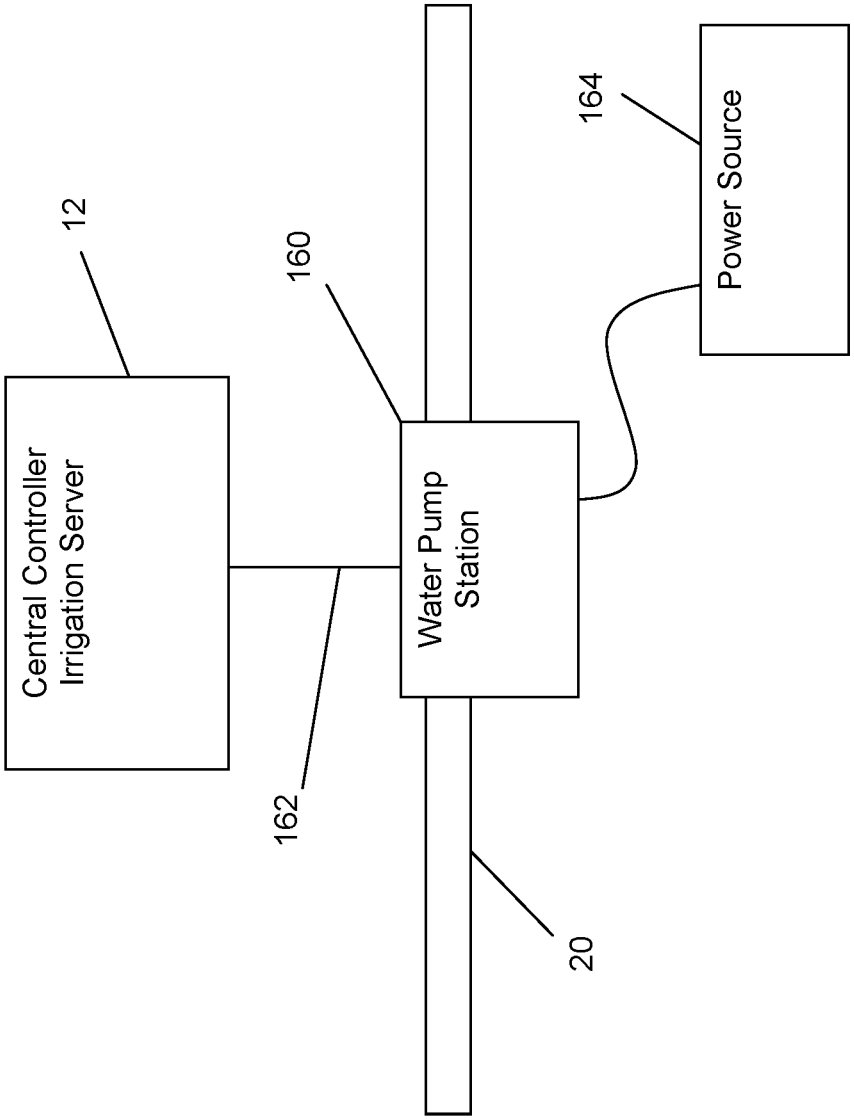
12
Central Controller
Irrigation Server
160
Water Pump
Station
162
164
Power Source
20

Figure 7

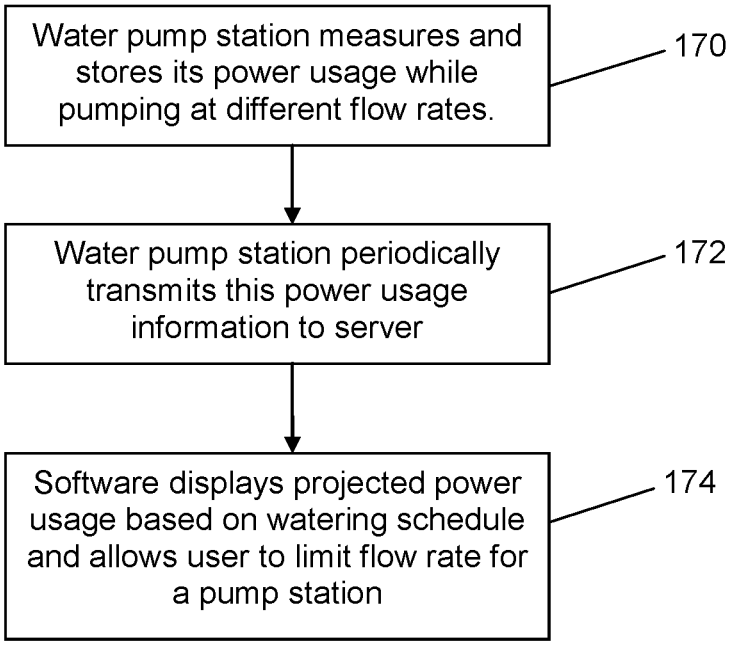
Water pump station measures and stores its power usage while pumping at different flow rates.
170
Water pump station periodically transmits this power usage information to server
172
Software displays projected power usage based on watering schedule and allows user to limit flow rate for a pump station
174

Figure 8

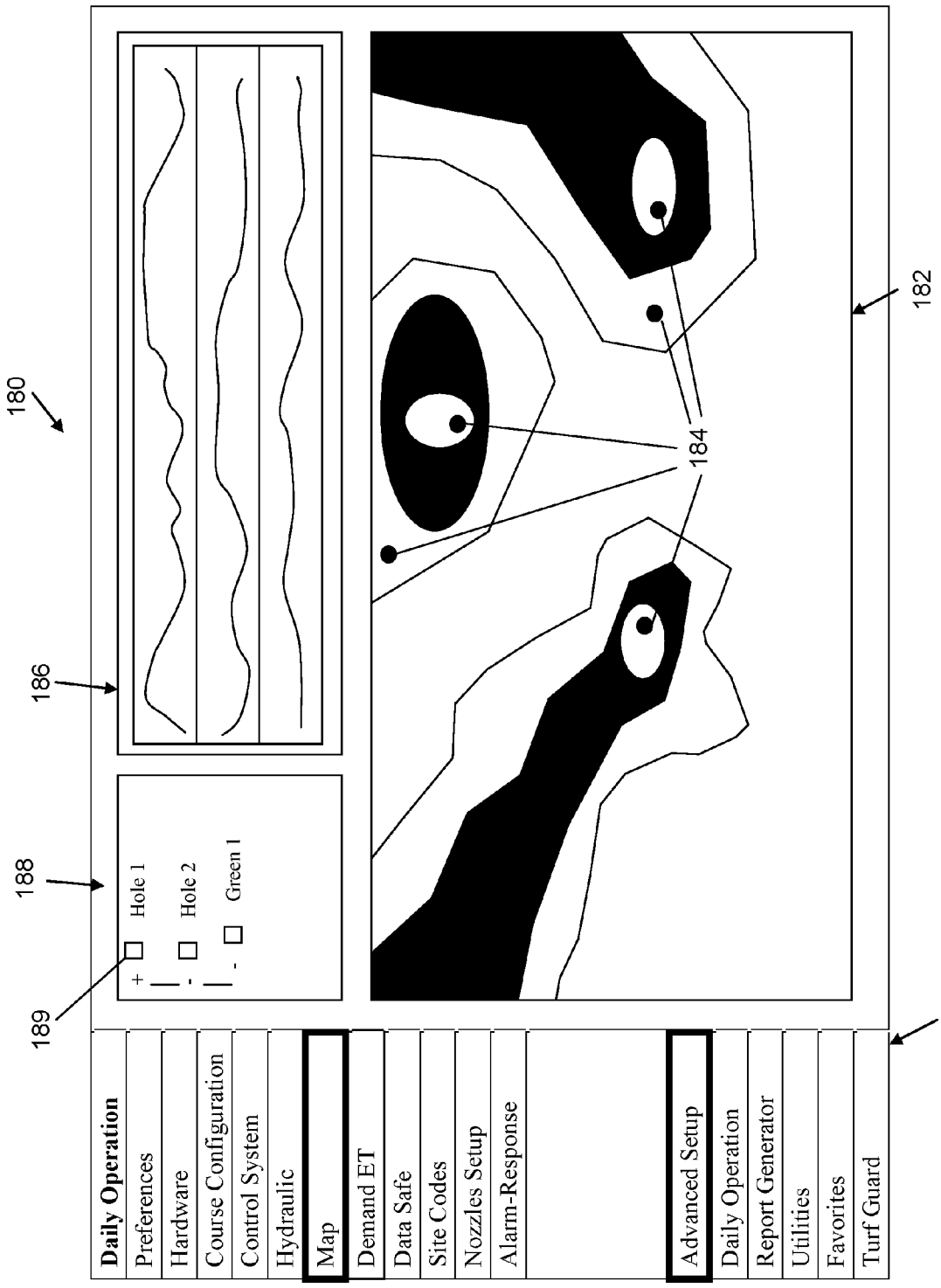
180
186
188
189
182
184
102
Daily Operation
Preferences
Hardware
Course Configuration
Control System
Hydraulic
Map
Demand ET
Data Safe
Site Codes
Nozzles Setup
Alarm-Response
Advanced Setup
Daily Operation
Report Generator
Utilities
Favorites
Turf Guard
Hole 1
Hole 2
Green 1

Figure 9

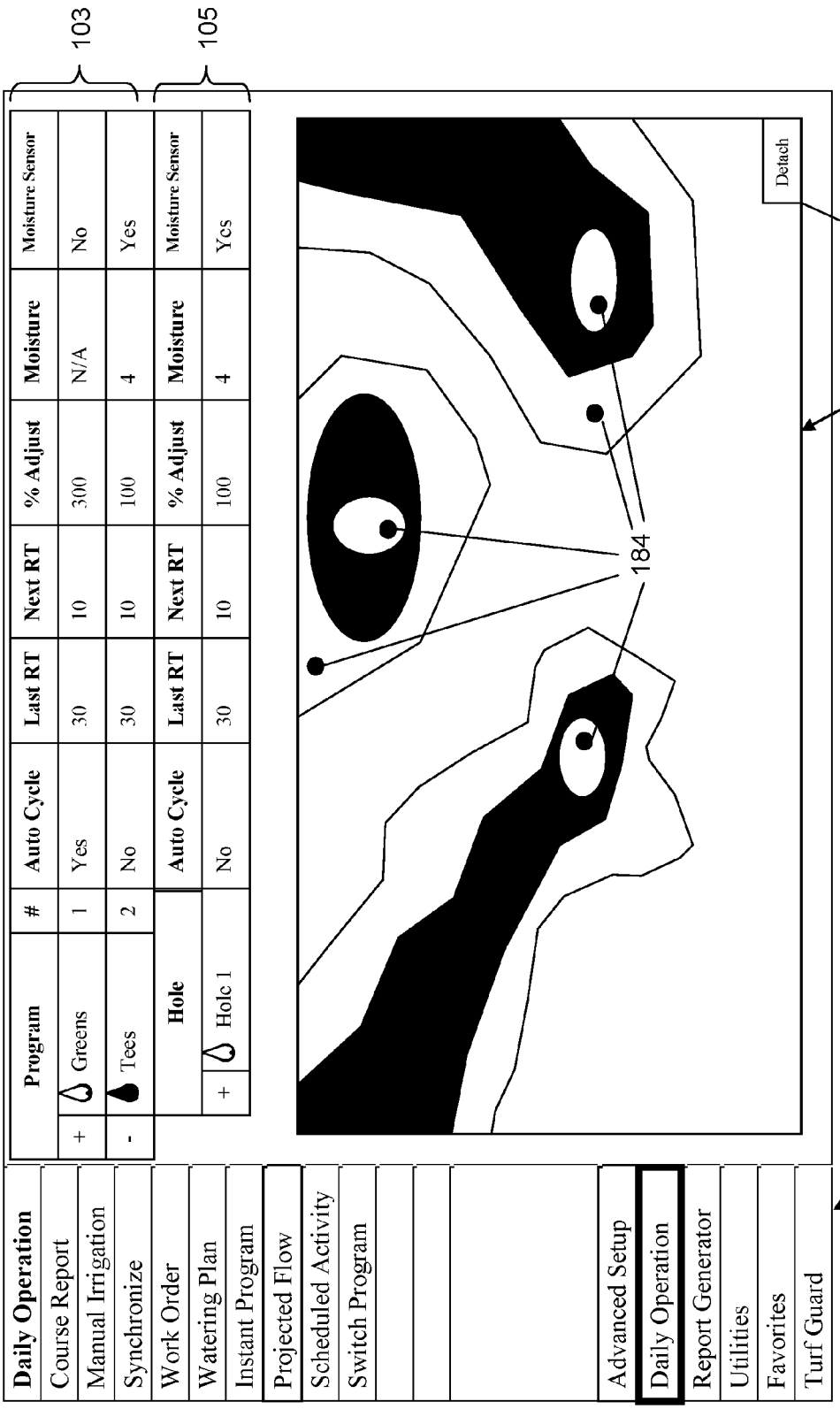
104
103
105
102
182
181
184
Daily Operation
Course Report
Manual Irrigation
Synchronize
Work Order
Watering Plan
Instant Program
Projected Flow
Scheduled Activity
Switch Program
Advanced Setup
Daily Operation
Report Generator
Utilities
Favorites
Turf Guard
Program
Auto Cycle Last RT Next RT % Adjust Moisture Moisture Sensor
+ Greens 1 Yes 30 10 300 N/A No
- Tees 2 No 30 10 100 4 Yes
Hole
Auto Cycle Last RT Next RT % Adjust Moisture Moisture Sensor
+ Hole 1 No 30 10 100 4 Yes
Detach

Figure 10

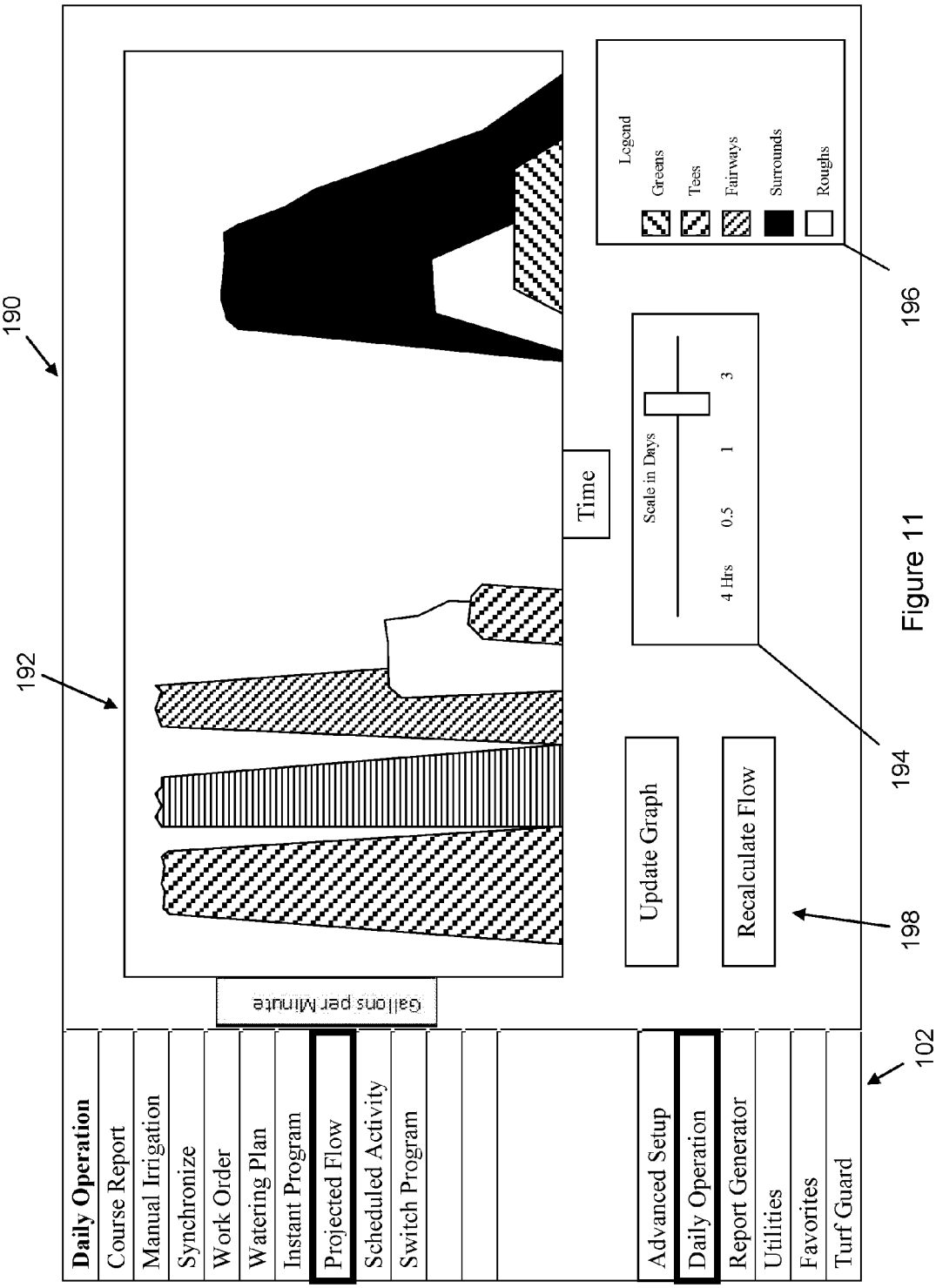
190
192
194
196
198
102
Daily Operation
Course Report
Manual Irrigation
Synchronize
Work Order
Watering Plan
Instant Program
Projected Flow
Scheduled Activity
Switch Program
Advanced Setup
Daily Operation
Report Generator
Utilities
Favorites
Turf Guard
Gallons per Minute
Time
Legend
Greens
Tees
Fairways
Surrounds
Roughs
Scale in Days
4 Hrs
0.5
1
3
Update Graph
Recalculate Flow

Figure 11

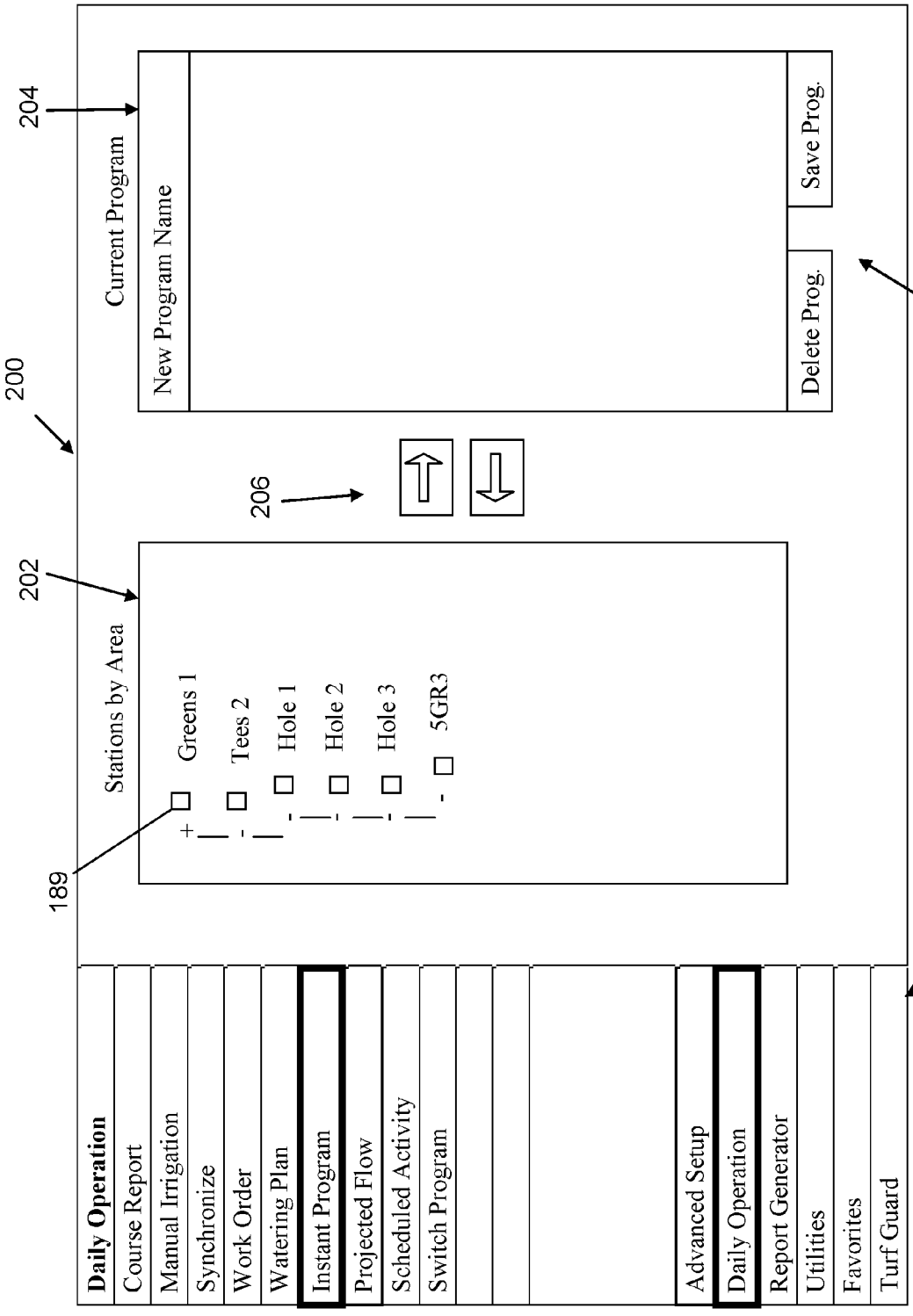
200
202
204
205
206
189
102
Daily Operation
Course Report
Manual Irrigation
Synchronize
Work Order
Watering Plan
Instant Program
Projected Flow
Scheduled Activity
Switch Program
Advanced Setup
Daily Operation
Report Generator
Utilities
Favorites
Turf Guard
Stations by Area
Greens 1
Tees 2
Hole 1
Hole 2
Hole 3
5GR3
Current Program
New Program Name
Delete Prog.
Save Prog.

Figure 12

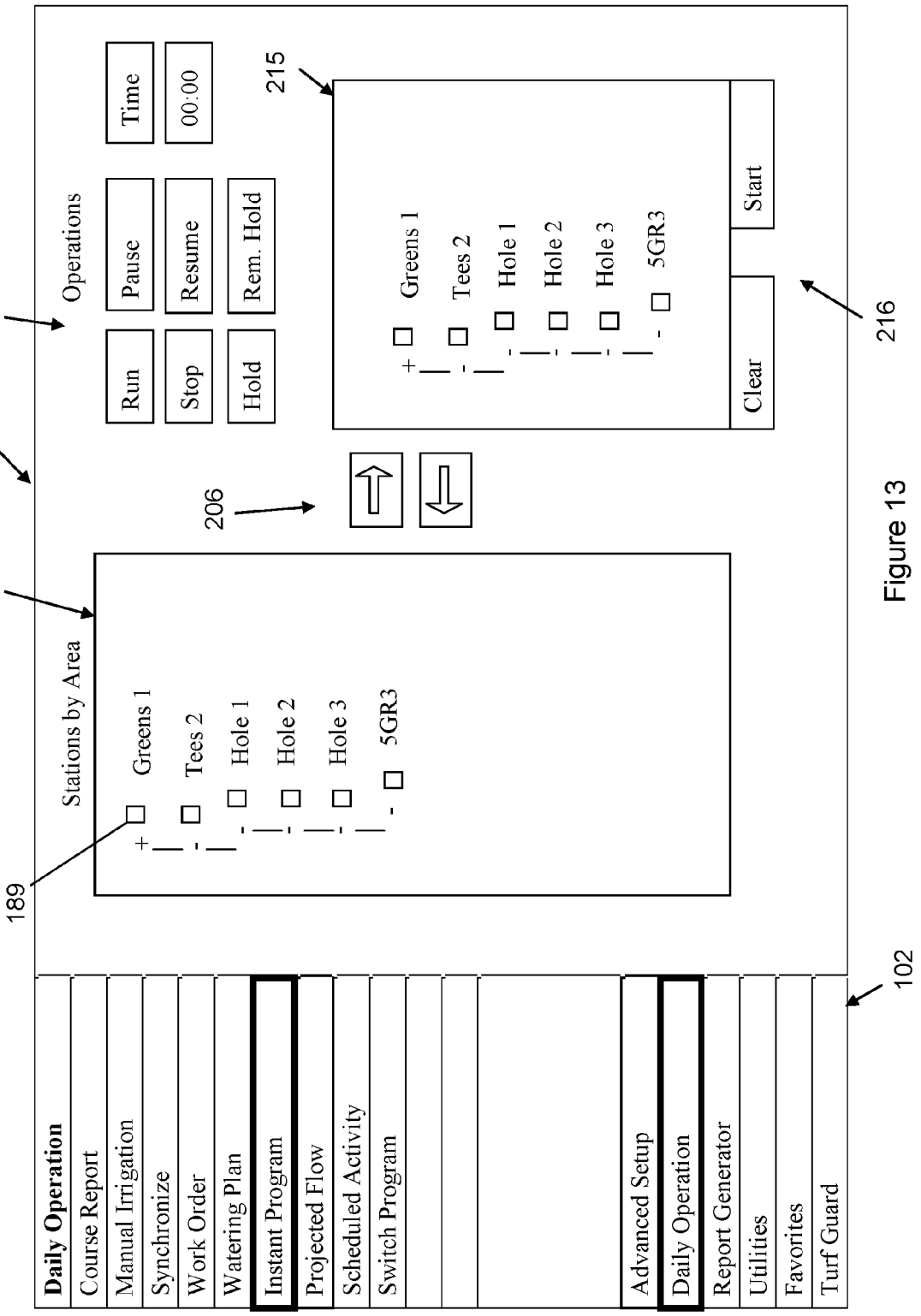
Daily Operation
Course Report
Manual Irrigation
Synchronize
Work Order
Watering Plan
Instant Program
Projected Flow
Scheduled Activity
Switch Program
Advanced Setup
Daily Operation
Report Generator
Utilities
Favorites
Turf Guard
102
Stations by Area
Greens 1
Tees 2
Hole 1
Hole 2
Hole 3
5GR3
189
212
210
206
214
Operations
Run
Stop
Hold
Pause
Resume
Rem. Hold
Time
00:00
215
Greens 1
Tees 2
Hole 1
Hole 2
Hole 3
5GR3
Clear
Start
216

Figure 13

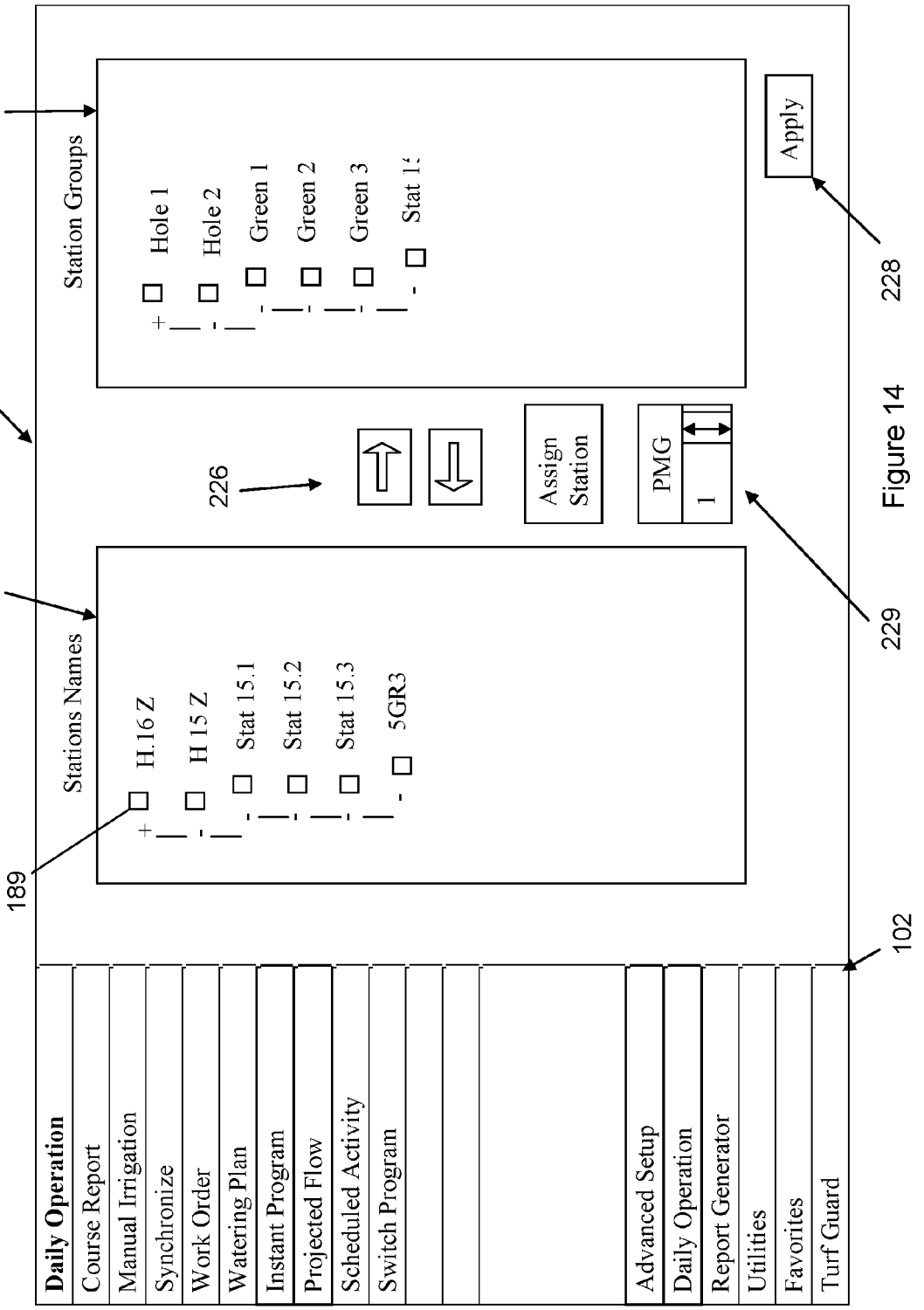
Daily Operation
Course Report
Manual Irrigation
Synchronize
Work Order
Watering Plan
Instant Program
Projected Flow
Scheduled Activity
Switch Program
Advanced Setup
Daily Operation
Report Generator
Utilities
Favorites
Turf Guard
102
Stations Names
H.16 Z
H 15 Z
Stat 15.1
Stat 15.2
Stat 15.3
5GR3
189
222
226
Assign Station
PMG
1
229
220
Station Groups
Hole 1
Hole 2
Green 1
Green 2
Green 3
224
Apply
228

Figure 14

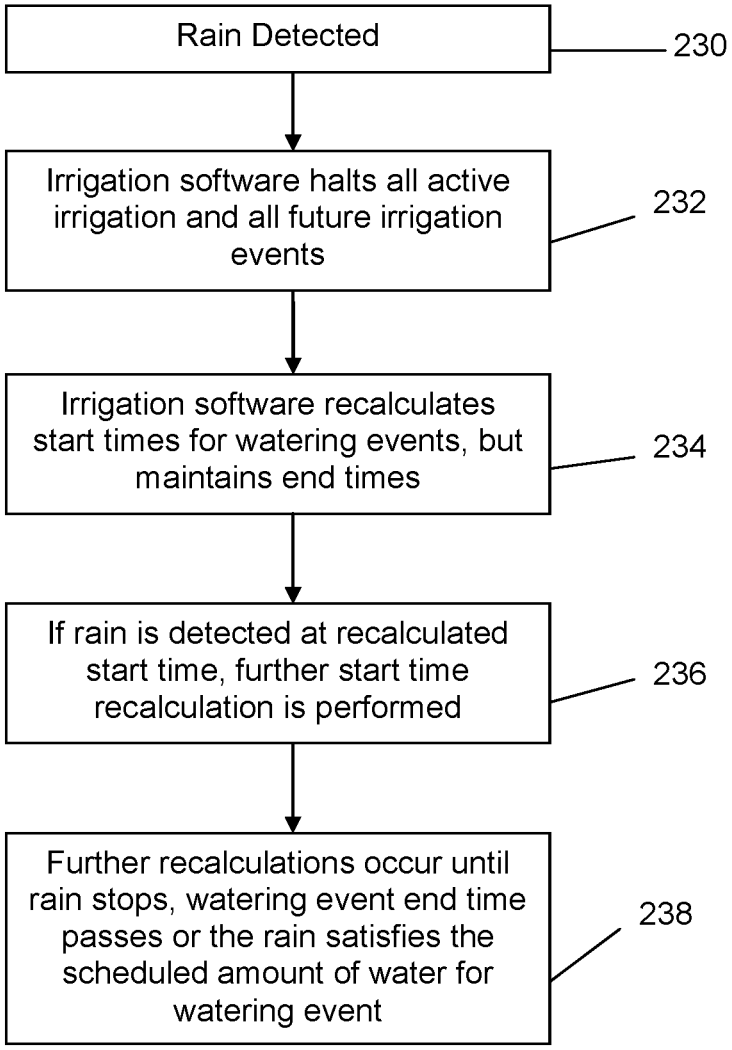
Rain Detected
230
Irrigation software halts all active irrigation and all future irrigation events
232
Irrigation software recalculates start times for watering events, but maintains end times
234
If rain is detected at recalculated start time, further start time recalculation is performed
236
Further recalculations occur until rain stops, watering event end time passes or the rain satisfies the scheduled amount of water for watering event
238

Figure 15

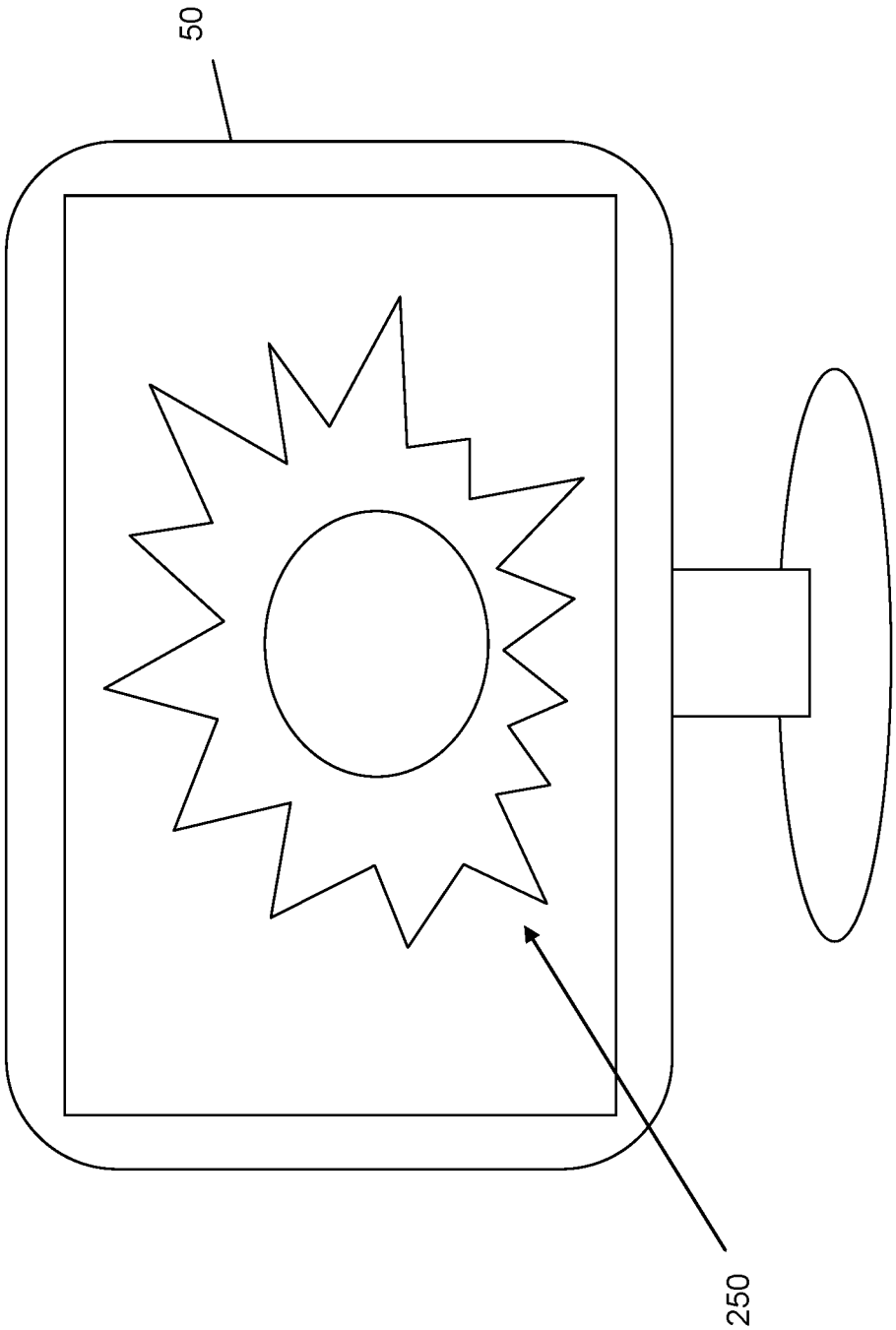

Figure 16

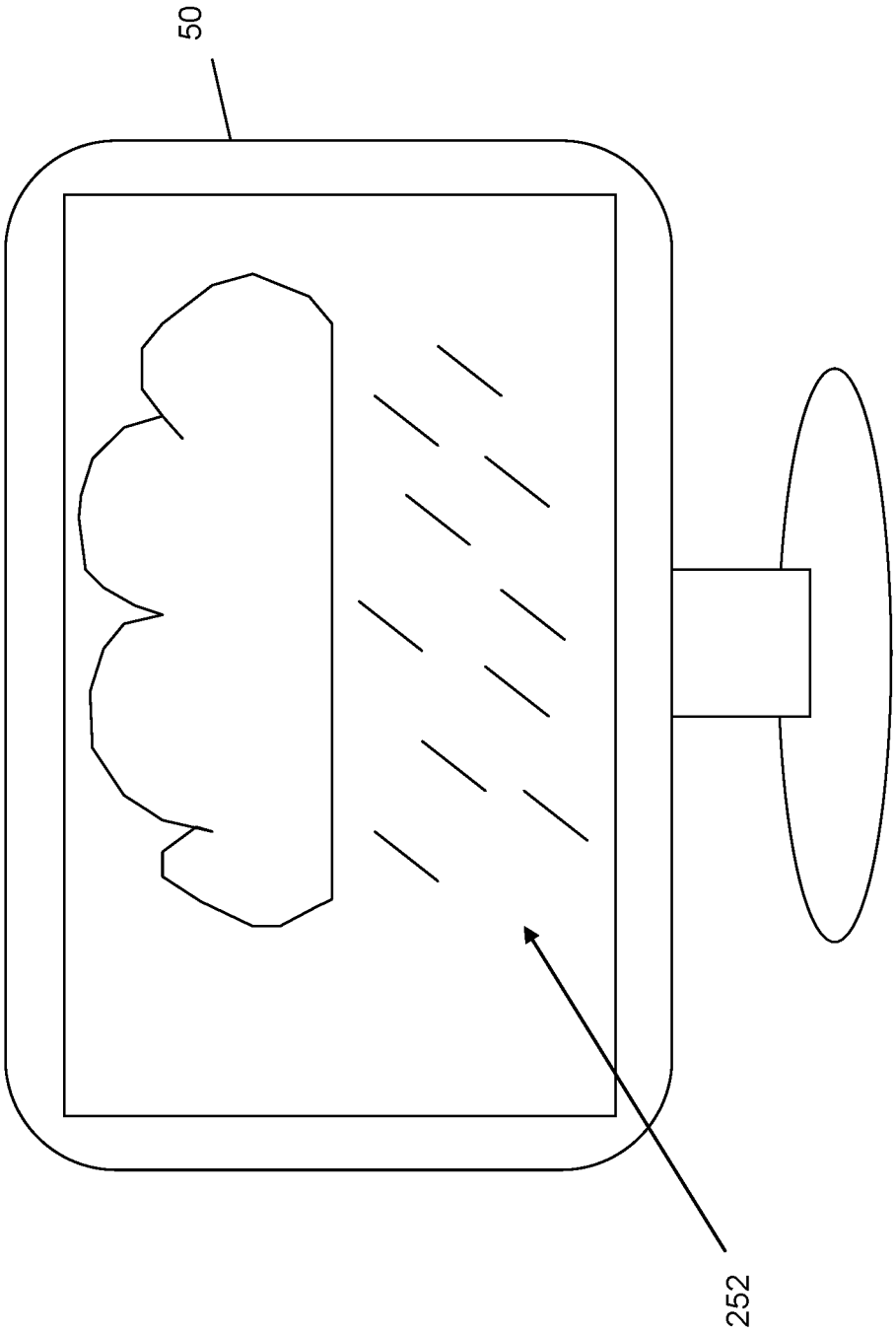

Figure 17

CENTRAL IRRIGATION CONTROL SYSTEM

RELATED APPLICATIONS

This application claims priority to U.S. Provisional Application Ser. No. 61/372,814 filed Aug. 11, 2010 entitled Central Irrigation Control System, the contents of which are incorporated in their entirety herein.

BACKGROUND OF THE INVENTION

Large irrigation systems typically include a central irrigation controller that is responsible for a variety of tasks associated with operation of the irrigation system. Such central controllers are typically software-based systems executed on a local computer system.

The central controller software is typically responsible for planning watering schedules and monitoring operation of the irrigation system. Watering commands or irrigation schedules are typically communicated to a plurality of satellite controllers at various locations on the site. The satellite controllers are connected to valves either in each of the sprinklers or a valve connected to sprinklers or groups sprinklers and can thereby direct each of the sprinklers to water according to the watering schedule.

SUMMARY OF THE INVENTION

In one embodiment of the present invention, irrigation software is provided for an irrigation system. The irrigation software may include a hierarchical watering plan display, water pump adjustment, water pump efficiency profile use, a soil moisture interface, a historical flow interface, a demand evapotranspiration (ET) interface, an instant program interface, a manual irrigation interface, a precipitation management group interface, a rain schedule adjustment algorithm, a map-to-monitor button, a universal start time shift interface, and a conditional screen saver.

BRIEF DESCRIPTION OF THE DRAWINGS

These and other aspects, features and advantages of which embodiments of the invention are capable of will be apparent and elucidated from the following description of embodiments of the present invention, reference being made to the accompanying drawings, in which:

FIG. **1** illustrates an irrigation system for use with the present invention.

FIG. **2** illustrates a view of an irrigation software display according to a preferred embodiment of the present invention.

FIG. **3** illustrates a flow chart for navigating a hierarchical interface according to the present invention.

FIG. **4** illustrates a flow chart for navigating a hierarchical interface according to the present invention.

FIG. **5** illustrates a flow chart for navigating a hierarchical interface according to the present invention.

FIG. **6** illustrates a view of an irrigation software display according to a preferred embodiment of the present invention.

FIG. **7** illustrates a view of a water pump station in communication with a server according to the present invention.

FIG. **8** illustrates a flow chart of a method for monitoring and using efficiency profiles for a water pump.

FIG. **9** illustrates a view of an irrigation software display according to a preferred embodiment of the present invention.

FIG. **10** illustrates a view of an irrigation software display according to a preferred embodiment of the present invention.

FIG. **11** illustrates a view of an irrigation software display according to a preferred embodiment of the present invention.

FIG. **12** illustrates a view of an irrigation software display according to a preferred embodiment of the present invention.

FIG. **13** illustrates a view of an irrigation software display according to a preferred embodiment of the present invention.

FIG. **14** illustrates a view of i an irrigation software display according to a preferred embodiment of the present invention.

FIG. **15** illustrates a method of recalculating irrigation schedule run times according to the present invention.

FIGS. **16** and **17** illustrate a computer monitor and a screen saver according to the present invention.

DESCRIPTION OF EMBODIMENTS

Specific embodiments of the invention will now be described with reference to the accompanying drawings. This invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments set forth herein; rather, these embodiments are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. The terminology used in the detailed description of the embodiments illustrated in the accompanying drawings is not intended to be limiting of the invention. In the drawings, like numbers refer to like elements.

FIGS. **1-16** illustrate various aspects of irrigation control software according to the present invention. Preferably, this control software is located on and executable by a computer. FIG. **1** illustrates an example irrigation system **10** having a central irrigation server **12**, such as a PC, which is in communication (e.g., wired or wireless) with a plurality of satellite controllers **14**. Each satellite controller is connected to a valve in a sprinkler **16**, thereby directly controlling when each sprinkler **16** waters. The central irrigation server **12** communicates watering schedule information to the appropriate satellite controller **14** and the satellite controller **14** operates its connected sprinklers **16** according to this watering schedule.

The central irrigation server **12** may alternately operate over a two-wire encoder/decoder network in which the server **12** is directly connected to each sprinkler **16** via two wires, as is known in the art. These wires provide power and communication signals for a decoder at each sprinkler valve. In this respect, each sprinkler **16** is directly controlled.

Preferably, the irrigation control software is executed by the central irrigation server **12** and stores data (e.g., in a database) in a locally attached storage device. Alternately, the irrigation control software can be executed and stored on a remote server and displayed on the central irrigation server **12** via a webpage over the internet.

Hierarchical Watering Plan Display

FIG. **2** illustrates a watering plan interface **100** of the central control software that uses a hierarchical display to provide both top-level or summary information and more detailed information about specific watering programs or schedules. More specifically, the watering plan interface allows for selectable visual expansion of various subcategories of an irrigation program.

In the specific example shown in FIG. **2**, the watering plan action is selected from the action menu **102**, which causes the watering plan interface **104** to display. The interface **104** includes a top-level information display **103** for each program comprising a plurality of information or control columns **108**. For example, these columns may include a program name, program number, auto cycle control, last runtime, last inches of water applied, next inches of water to be applied, percentage adjust, program start time, priority level, active days, run

time calculation adjustments, evapotranspiration mode, evapotranspiration source, reference evapotranspiration value, rainfall amount and a soil moisture sensor value (e.g., from a Turf Guard™ sensor).

The top level information display **103** also includes a "plus/minus" expansion symbol **110** that allows the user to expand or hide subcategories of the main program (e.g., the plus symbol indicates that expansion can occur and the minus symbol indicates that a subcategory is expanded). In the example of FIG. **2**, the first subcategory tier **105** illustrates geographic areas that are watered with the program, such as holes of a golf course. This first subcategory tier **103** preferably includes the same or similar columns **108** as the top level program **103**. Additionally, each first subcategory tier **105** can include its own selectively expandable second subcategory tier **107**, which, in the present example, refers to individual sprinklers residing on the selected hole, a sub set of the selected area.

While not shown, it is possible to add yet additional expandable subcategories under each station displaying information for each sprinkler connected to a specific satellite station. For example, sprinkler column information may include a sprinkler popup indicator, nozzle rotation indicator and a sprinkler water flow indicator.

As seen in the operation flow chart of FIG. **3**, the user clicks on the "plus" sign **110** next to a specific top level category **103** program name **120**. This action causes the software to display a list of geographic subcategories in the first subcategory tier **105** beneath the top level category program name, including information and control columns **108** associated with the subcategory entries **122**. The user clicks on the "plus" **110** next to a geographic subcategory name **124**. This action causes the software to display a list of sprinklers beneath the geographic subcategory entry in the second subcategory tier **107**, including information and control columns **108** associated with each entry **126**.

As best seen in FIG. **2**, the top level program information also includes a colored indicator **112**A and **112**B that identifies problems or proper functioning of an irrigation program. In the example of FIG. **2**, a white rain drop-shaped indicator **112**A indicates proper functionality and a black rain drop-shaped indicator **112**B indicates a problem with the irrigation schedule or various components. The indicators **112**A and **112**B may alternately display a solid color, such as green or red, or a mixed color, such as part green and part red.

In this respect, the top level indicator can indicate if all areas and stations in the subcategories beneath it are operating properly (e.g., color is all green or white **112**A), one or more stations have errors or failed to water (e.g., color is partially green and red or black and white), or all areas and stations have errors or failed to water (e.g., color is all red). Each sub category can have similar indicators, identifying errors or proper functioning of that specific subcomponent. Thus, a user can selectively view each subcategory to determine where an error warning is being generated.

As seen in the operational flow chart of FIG. **4**, a problem with a component of the irrigation system **10** used in an irrigation schedule causes the software to display a mixed green and red color in the rain drop-shaped indicator **112**, seen in **130**. In **132**, the user clicks on the plus expansion symbol **110** of the top level tier **103** to expand the first subcategory tier **105**. In **134**, the user reviews the geographic areas of the first subcategory tier **105** and determines which areas have a red or problem indicator **112** associated with them. In **136**, the user expands the sprinkler subcategory of the second subcategory tier **107** and in **138** reviews stations or sprinklers that have a red or problem indicator **112**. Once the stations or sprinklers with errors have been identified by the user, corrective action can be performed to address the problem.

Water Pump Adjustments

FIG. **6** illustrates a water pump adjustment interface **150** that displays water pump usage graphs **152** and adjustable limits **154** (e.g., sliders) on the amount of water flow a pump can deliver. The sliders **154** of the pump preferably display a percentage of the pump output **156**, a limit amount in gallons per minute **158** and an electricity amount in kilowatts per hour **159**. Hence, the user can limit a pump output based on water flow and or electricity usage.

As seen in FIG. **7** and the flow chart of FIG. **8**, the central controller server is preferably connected to a water pump station **160** (e.g., an ITT Flowtronex pump system with Nexus communication capability) via wired or wireless communications line **162** to obtain data for the water pump adjustment interface (step **170**). The water pump station **160** measures and stores its power usage from a power source **164** at different flow rates (i.e., different rates that water is pumped through the pump station **160** and through water line **20**, step **172**). In this respect, the pump station **160** creates and maintains a power efficiency profile for the pump **160** and then communicates this information to the central controller software. Since the efficiency of pump stations **160** tends to change over time (e.g., become less efficient at certain pump speeds with wear, tear, dirt, etc.), the efficiency profile is periodically sent to the central controller software.

In step **174**, the software stores the efficiency profile data (e.g. in a database) and displays the corresponding data on the water pump adjustment interface **150**. Returning to FIG. **6**, the power efficiency profile data can be displayed in the KW/hour display **159** that is associated with each slider **154**, displaying rate of power usage and the cost of the power usage (assuming an electricity rate cost is known). As the user adjust the slider **154** upward or downward to modify the flow rate, the KW/hour display **159** changes according to the pump profile. Additionally, the pump usage graphs can display data on the efficiency profile data in a variety of different ways, such as the rate, cost or total amount of electricity for a desired amount of time. In this respect, the power usage and electric cost for an irrigation schedule can be directly managed.

Soil Moisture Sensor Data

The central controller software can accept data from a plurality of soil moisture sensors located on the irrigated turf. This soil moisture data can be stored on the server **12** that executes the central controller software or other locations.

FIG. **9** illustrates a soil moisture interface **180** for selectively displaying soil moisture data from the plurality of soil moisture sensors. For example, the user can select which moisture sensor's data is displayed by selecting check boxes **189** in a hierarchical list display **188** of available moisture sensors. Data from selected moisture sensors can be displayed in a variety of different graphs, such as those in graph display **186**, that illustrates several moisture history levels, temperature history levels and salinity history levels. A map display **182** can also display the relative location of each moisture sensor by displaying moisture sensor icons **184**, based on which check box **189** is checked. Additionally, both the moisture level and an irrigation schedule can be displayed on a single graph, allowing a user to compare the alignment of the moisture level with the irrigation schedule.

As seen in FIG. **10**, the watering plan interface **104** and map display interface **182** can also be displayed simultaneously, allowing the user to view the irrigation schedule and the relative locations of soil moisture sensors (or other map items, such as sprinklers).

Flow Interface

As seen in FIG. **11**, the central control software also includes a flow interface **190** that displays a flow graph **192** showing past flow (i.e., historical water flow) and future flow according to the watering schedule. Preferably, this flow data is presented in a multicolored graph where each color represents flow from different geographic locations, watering stations, satellite controllers or sprinklers as seen in the legend box **196**.

In one example, the graph **192** graphs the gallons per minute versus the time. The scale interface **194** allows a user to adjust the scale of time on the graph **192** while the interface buttons **198** control graph updates and flow recalculations. Alternately, this graph **192** can be displayed on the same page as the watering plan interface **104**, allowing a user to view past watering activity, compare this activity to the irrigation schedule (e.g., to see if a prior user made manual watering applications), and see future planned water flow activity.

Demand ET Interface

Preferably, the irrigation software includes a demand evapotranspiration (ET) interface that allows a user to input various ET data such as maximum demand ET, total area, water allotment, manual ET value, low temperature, high temperature, and historic ET values per month. This allows the user to limit and customize the maximum amount of water than can be added to an irrigation schedule due to ET values.

Instant Program Interface

FIG. **12** illustrates an instant program interface **200** which allows a user to create a new watering program via a hierarchical interface **202** to run immediately or at a later date. Specifically, watering stations are shown in the hierarchical interface **202** (which operates similarly to interface **108**) based on geographic location (e.g., golf course hole). The user can use checkboxes **189** to select irrigation stations and then use arrows **206** to move the stations over to the current program window **204**. Once the user has added all of the desired stations, the current program window **204**, the program can be named and either saved or deleted via interface buttons **205**. Once saved, the program can be set to run immediately or at a future date.

Manual Irrigation

FIG. **13** illustrates a manual irrigation interface **210** that allows a user to manually activate specified irrigation stations (e.g., satellite stations) and their associated sprinklers. The user can make a station selection via a selection area **212** (similar to previously described selection area **202** with checkboxes **189**) which provides a hierarchical display **212** based on various aspects such as types of areas (e.g., golf tees, fairways, holes, etc.).

Once selected, the interface buttons **206** can be used to copy the selected stations to the manual program window **215** where various program actions can be selected via program buttons **214** (e.g., run, pause, stop, resume, hold, remove hold and length of runtime). Finally, the buttons **216** can be used to start or clear the program.

Precipitation Management Groups

FIG. **14** illustrates a station group interface **220** that allows a user to create a group of irrigation stations that are associated with each other (such as golf greens, holes, roughs or other geographic locations). In this respect, groups of stations can be programmed or adjusted together.

Stations are shown in hierarchical station display **222**, allowing for individual selection via checkboxes **189**. Once selected, the stations can be added, removed or assigned to a group via buttons **226** and will display in a hierarchical station group display **224**. When the station groupings are properly arranged, the user can a group name in the desired station group display **224** and apply the groupings with the apply button **228**.

Stations may also be assigned a Precipitation Management Group number via the number increment interface **229** that is used by the flow management routine of the irrigation software to manage the application rate of water. This control is used to limit stations from running at the same time as other stations. In this respect, the rate of precipitation for multiple sprinklers from a geographic area can be fine-tuned to reduce possible runoff of the water (i.e., delivering water faster than the turf can absorb).

Rain Schedule Adjustment

Preferably, the central controller software also includes a feature to adjust or delay an irrigation schedule in the event of rain as seen in the flow chart of FIG. **15**. In **230**, rain is detected (e.g., by a rain sensor or weather station in communication with the server **12**).

In **232**, any active watering events (i.e., a length of time a station is programmed to irrigate) of the irrigation schedule are terminated. All future watering events have their start time immediately and periodically recalculated to a later time, but the end time of each irrigation event of the irrigation schedule is maintained, as seen in **234**. Preferably, this calculation reduces the scheduled duration of the irrigation events based on an amount equal to the rain fall that has been received at that point in time. For example, if one inch of rain has fallen, the irrigation event's start time is reduced by an amount of time equal to irrigate one inch of rain.

If the rain is still falling at the recalculated start time for a watering event in the schedule, the start time (but not the end time) is further recalculated to a later time and the duration of the watering event is further reduced, as seen in **236**. As seen in **238**, this pattern continues until the rain stops, the originally scheduled duration has been completely satisfied by the received rain fall or the "anchored" irrigation end time passes.

Map To Second Monitor Button

As seen in FIG. **10**, the irrigation software interface includes a map detachment button **181** that removes or hides the map display **182** from the current interface view and displays the map display **182** on a second monitor connected to the same server **12**. In other words, the map detachment button causes the map display **182** to "move over" to a second monitor that may be attached to the server **12**. This function allows a user to view a greater amount of data from another interface (e.g., watering plan interface **104**) which may span the entire first monitor, while the entire second monitor can display the geographic irrigation map.

Start Time Shift

Returning to FIG. **2**, the irrigation software preferably includes a start time shift interface **107** that allows a user to shift the start times for all watering events for a schedule forward or backward in time. The interface **107** preferably includes a time input window for specifying the amount of time to shift all watering events and forward/backward buttons **107**B for executing forward or backward time shift. Hence, the user can easily and quickly shift all watering event times without directly modifying the relatively complex irrigation schedule.

Conditional Screen Saver

FIGS. **16** and **17** illustrate a computer monitor **50** that displays a conditional screen saver based on the rain/hold state of the irrigation software. When rain, site use, maintenance or a similar an event occurs, an irrigation software user may decide to halt or "hold" an irrigation schedule until the rain or event stops (e.g., by pressing a "hold" button on the software interface). Often, a user may forget that the irriga-

tion schedule has been set to hold or stop all irrigation and therefore may inadvertently prevent irrigation for a longer period of time than desired.

The conditional screen saver helps alert the user to hold status of the irrigation software by displaying several screen savers on the server **12** based on the hold status. For example, screen saver **250** may indicate that the irrigation schedule hold is off, allowing normal irrigation. This screen saver may be a company logo, a sun or even a text message indicating the hold status. Screen saver **252** may indicate that the irrigation schedule hold is on, preventing normal irrigation according to the schedule. This screen saver may be a raining cloud, a circle with a diagonal line through it or a text message indicating the hold status.

When a user modifies the hold status, the irrigation software preferably changes the operating systems screen saver functionality to include the desired text or graphics. Therefore, the server **12** can operate according the screen saver of the rules of the operating system (e.g., Windows, Mac or Linux) while communicating the hold status of the irrigation software.

Although the invention has been described in terms of particular embodiments and applications, one of ordinary skill in the art, in light of this teaching, can generate additional embodiments and modifications without departing from the spirit of or exceeding the scope of the claimed invention. Accordingly, it is to be understood that the drawings and descriptions herein are proffered by way of example to facilitate comprehension of the invention and should not be construed to limit the scope thereof.

What is claimed is:

1. A system for controlling irrigation comprising:

a server;

software executable on said server and configured for programming and running an irrigation schedule for an irrigation system; said software causing said server to graphically display a hierarchical watering plan interface comprising:

a top level information display, displaying a plurality of watering program entries vertically listed relative to each other; said watering program entries including a program name; and,

a plurality of top level expansion elements that are each located near and correspond to one of said plurality of watering program entries;

wherein a user click event on one of said plurality of top level expansion elements displays a previously hidden first subcategory tier immediately beneath a corresponding watering program entry and above any of said plurality of watering program entries below said one of said plurality of watering program entries; said first subcategory tier displaying a plurality of geographic area entries corresponding to one of said plurality of watering program entries.

2. The system of claim **1**, further comprising:

a plurality of geographic area expansion elements that are each located near and correspond to one of said plurality of geographic area entries;

wherein a user click even on one of said plurality of geographic area expansion elements displays a previously hidden second subcategory tier displaying a plurality of individual sprinkler entries.

3. The system of claim **1**, further comprising a plurality of problem indicator elements that provide a visual indication of a problem and that are each located near and correspond to one of said plurality of watering program entries or said plurality of geographic area entries.

4. The system of claim **3**, wherein when at least one of said plurality of problem indicator elements activates; a second one of said problem indicator elements corresponding to one of said watering program entries also activates.

5. The system of claim **1**, wherein said first subcategory tier display comprises a plurality of horizontally-arranged columns, including a geographic name column.

6. The system of claim **2**, wherein said second subcategory tier display comprises a plurality of horizontally-arranged columns, including an irrigation station name column.

7. A system for controlling irrigation comprising:

a non-transitory computer readable medium comprising a plurality of instructions configured for execution at a server, said instructions configured to cause said server to:

display a selectively expandable hierarchical watering plan display having a top level containing a list of one or more watering programs vertically listed and containing a watering program name; and,

a first subcategory display that is selectively user-toggled between a hidden state and a displayed state via a watering program expansion symbol displayed near each of said one or more watering programs;

said first subcategory display displaying watering plan information corresponding to and immediately below one of said one or more watering programs positioned immediately above said first subcategory display; said first subcategory display being further positioned above any of said one or more watering programs located below said one of said one or more watering programs.

8. The system of claim **7**, wherein said top level of said hierarchical watering plan display comprises, a last runtime column, a next runtime column, and a percent adjust column.

9. The system of claim **7**, wherein said first subcategory display displays watering plan information for a geographic area.

10. The system of claim **7**, wherein said first subcategory display displays watering plan information for each of a plurality of sprinklers.

11. The system of claim **7**, a plurality of problem indicator icons that are each located adjacent to and associated with one of an item of said top level or said first subcategory; said plurality of problem indicator icons having a first state indicating an irrigation problem and a second state indicating no irrigation problems.

12. The system of claim **11**, wherein any problem indicator icons associated with one of an item of said top level changes to said first state indicating a problem when any of said problem indicator icons associated with one of said first subcategory associated with said one of said item of said top level also changes to said first state indicating a problem.

13. A system for controlling irrigation comprising:

a non-transitory computer readable medium comprising a plurality of instructions configured for execution at a server, said instructions configured to cause said server to:

display a hierarchical watering plan list having a first hierarchy level and a plurality of first hierarchy level entries that are vertically listed within said hierarchical watering plan list and that each include a program name, a second hierarchy level that is user-toggled between a hidden state and a displayed state beneath each entry of said first hierarchy level, and a third hierarchy level that is user-toggled between a hidden state and a displayed state beneath each entry of said second hierarchy level;

wherein said second hierarchy level and said third hierarchy level are located beneath one of said plurality of first

hierarchy level entries and above any of said plurality of first hierarchy level entries located beneath said one of said plurality of first hierarchy level entries.

14. The system of claim **13**, wherein said each entry of said first hierarchy level contains information relating to an individual irrigation program.

15. The system of claim **14**, wherein said each entry of said second hierarchy level contains information relating to different geographic regions of turf.

16. The system of claim **15**, wherein each entry of said third hierarchy level contains information relating to individual sprinklers within said different geographic regions of turf.

17. The system of claim **16**, further comprising a plurality of alert icons, each of which associated and positioned near an entry for said first hierarchy level, said second hierarchy level, and said third hierarchy level, wherein each of said plurality of alert icons are programmed to change to an alert state when any of said plurality of alert icons in a lower associated hierarchy level change to said alert state.

18. The system of claim **13**, wherein said first hierarchy level, said second hierarchy level, and said third hierarchy level all include a last runtime column, a next runtime column and a start time column.

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